

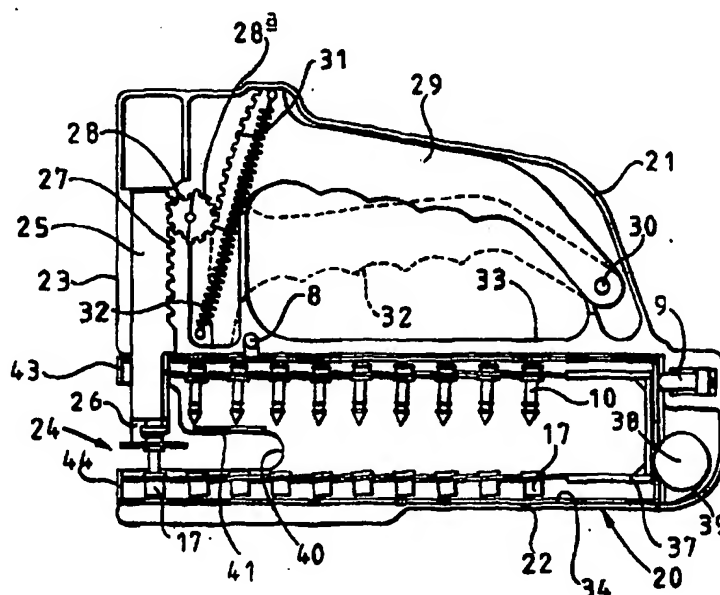
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(54) Title: A DISPENSING DEVICE FOR APPLYING TWO-PART TAGS



## (57) Abstract

A dispensing device for applying two-part ear tags to animals comprises a housing (20) having a handle (21), there being inserted in a storage chamber (22) of the housing a removable cartridge containing two spaced rows of tag parts (10, 17) which are fed by a spring device (39) to an operating location (24). Squeezing a lever (29) upwardly into the handle (21) drives a plunger (25) downwardly into the operating location (24) so as to disengage an upper tag part (10) from its position in the cartridge and drive it through the animal's ear and into engagement with the corresponding lower tag part (17) in the cartridge, so that the two-part tag becomes affixed to the animal's ear. The transmission between the lever (29) and the plunger (25) comprises a pinion device (28, 28a) which is rotatably mounted on the body of the device and meshes with toothed racks on the lever (29) and plunger (25) respectively.

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"A Dispensing Device for Applying Two-Part Tags"

The invention relates to a dispensing device for applying two-part tags and particularly, but not exclusively, for dispensing two-part ear tags of the kind used for the identification of livestock.

In one common form of two-part ear tag, each part of the tag includes a disc or similar flat element. One tag part is formed with a spike which may be received in locking engagement within a socket formed on the other part. In use, the part carrying the socket is located on one side of the animal's ear, and the spike on the other part is then driven through the ear and into locking engagement with the socket. One or both of the discs or other flat parts of the tags may then carry data for the purposes of identification of the animal.

In order to apply such a two-part tag to an animal's ear, there is normally supplied a special applicator of pliers-like form having opposed jaws on which the two tag parts may be mounted respectively. Manual closure of the jaws then forces the spike on one part through the ear and into locking engagement with the other part.

However, using such a form of applicator is a time consuming business in view of the necessity of having to extract two different tag parts from a supply of tags, fit the two parts on to the respective jaws of the applicator, and then operate the applicator to apply

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the tag. The present invention sets out to provide a dispensing device in which pairs of tag parts are fed successively to an operating location on the device where they are driven together and applied to an animal's ear. A large number of animals may therefore  
5 be tagged rapidly and with ease.

According to the invention there is provided a dispensing device for applying two-part tags, the device comprising a main body part, means for supporting a  
10 first tag part in an operating location on the body part, means for supporting a second tag part in said operating location but spaced from the first tag part, an operating device mounted on the main body part and movable from a rest position to displace the first tag  
15 part into locking engagement with the second tag part, operator controlled actuating means for effecting said movement of the operating device, means for returning the operating device to said rest position, and means for feeding pairs of first and second tag parts  
20 successively to said operating location from supplies of said tag parts.

The operating device may comprise a plunger assembly mounted for reciprocating movement, for example linear reciprocating movement, on the main body part and  
25 having a head portion for engagement with said first tag part.

Said head portion of the plunger assembly preferably includes means for releasably gripping said

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first tag part, during its displacement into locking engagement with the second tag part.

The gripping means may comprise a plurality of spaced gripping elements movably mounted on the plunger  
5 assembly and operating means for automatically moving said gripping elements inwardly into gripping engagement with said first tag part as the plunger assembly is moved towards said first tag part.

In a preferred embodiment said plunger  
10 assembly comprises a plunger on which said gripping elements are movably mounted, and an operating member capable of limited movement relative to the plunger, the operating member being adapted to effect said inward movement of the gripping elements as a result of said  
15 limited relative movement. The operating member may comprise a sleeve which surrounds the plunger, the sleeve having at one end thereof a formation shaped to cooperate with the gripping elements to effect said inward movement of the gripping elements when the sleeve  
20 moves relatively to the plunger.

The actuating means may comprise a manually movable member mounted on the body part and coupled to the operating device. For example, the manually movable member may comprise a lever pivotally mounted on the  
25 body part and coupled to the operating device by a suitable transmission. The transmission may include a rack and pinion mechanism.

Alternatively, the actuating means may

comprise power operated means, such as a fluid actuated piston and cylinder device. The means for returning the operating device to the rest position may comprise spring means, and such spring means may be connected  
5 between the actuating means and the main body part.

The means for feeding pairs of first and second tag parts to the operating location may comprise first and second guideways leading to the operating location and adapted to receive a plurality of first and  
10 second tag parts respectively, means being provided to urge the tag parts along their respective guideways. Said means may comprise pusher elements engaging those tag parts in the respective guideways which are furthest from the operating location, thereby to push all the tag  
15 parts in the guideway towards the operating location. The pusher elements may comprise parts of a single pusher unit.

Spring means, such as a coiled leaf spring, may be provided to urge the pusher elements towards the  
20 operating location.

The guideways may include channels which receive portions of the tag parts respectively.

There may be provided, for use with the dispensing device, at least one holder for a plurality  
25 of pairs of tag parts, the holder being adapted to support said tag parts in position one next to another in the relationship required for the dispensing device. Preferably the aforesaid guideways are provided on the

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holder, the holder being adapted to be connected to the main body part of the dispensing device in such manner that the guideways are in the required position with respect to the operating location.

5           At least one of said guideways may be so shaped as to receive a plurality of tag parts in side-by-side overlapping relationship.

The following is a more detailed description of embodiments of the invention, reference being made to  
10 the accompanying drawings in which:

Figure 1 is a side elevation of the parts of one form of two-part tag,

Figure 2 is a side elevation showing the two parts of the tag locked together,

15           Figure 3 is a sectional view through a dispensing device according to the invention,

Figure 4 is a front view of the dispensing device of Figure 3,

Figure 5 is a cross-section through a tag-  
20 holding cartridge for use with the dispenser of Figures 3 and 4, and

Figure 6 is a similar view to Figure 3 of an alternative form of dispenser.

Referring to Figure 1, there is shown a two-  
25 part tag of a typical kind with which a dispensing device according to the invention may be employed.

The first part 10 of the tag comprises a spike  
11 having a pointed end 12 and, opposite the pointed

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end, a flat circular disc 13. An enlarged head 14 extends a short distance above the disc 13, being separated therefrom by a neck portion 15.

The conical pointed end portion 12 of the  
5 spike 11 is of slightly greater diameter than the main body of the spike and a peripheral ridge 16 extends around the spike a short distance above the pointed end.

The second part 17 of the tag comprises a further circular disc 18 formed on a cylindrical socket  
10 part 19, which is formed with an internal circumferential ridge (not shown). The relative diameters of the spike 11 and socket 19, and of the ridges thereon, are such that when the spike 11 is driven into the socket 19, as shown in Figure 2, the end  
15 of the spike is firmly retained within the socket by virtue of the inter-engaging ridges on the two parts.

The two parts of the tag may conveniently be moulded from suitable plastics material. Either or both of the discs 13, 18 may have identification marks  
20 thereon, or there may be provided a separate larger "flag" carrying the identification information, which flag snaps over the enlarged head 14 on the part 10 of the tag.

It should be stressed that the tag shown in  
25 Figures 1 and 2 is only one example of the type of two-part tag to which the invention relates.

As previously mentioned, when it is required to apply a two-part tag of this kind to an animal's ear,



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the parts are usually fitted to the opposed jaws of an applicator in the general form of a pair of pliers. Manual closure of the jaws forces the spike 11 through the animal's ear and into locking engagement with the  
5 socket 19 on the other tag part.

Figures 3 and 4 show in greater detail a dispensing device for applying such tags to animals' ears.

The device comprises a hollow housing 20 which  
10 may conveniently be formed in two similar parts moulded from rigid plastics material. Only one half of the housing is shown in Figure 3. The housing provides a handle 21, a storage chamber 22 and an operating chamber 23. An operating location, generally indicated at 24,  
15 is disposed at the end of the storage chamber 22 adjacent the operating chamber 23.

A plunger 25 is reciprocally mounted in the operating chamber 23 for vertical sliding movement and the lower end of the plunger has a head portion 26  
20 shaped to engage the head portion 14 of a tag part 10, in a manner to be described. The plunger 25 is slidably mounted in bearings in the chamber 23 and carries along one edge a toothed rack 27 with which meshes a rotatably pinion 28 mounted on the housing for rotation about a  
25 fixed axis.

An operating lever 29 is pivotally mounted at one end to the handle 21, as indicated at 30, and is formed at the other end with an arcuate toothed rack 31

which is centred about the pivot axis 30 of the lever and is in meshing engagement with a pinion 28a which is co-axial with the pinion 28, and rotates therewith. A helical tension spring 32 is connected between the free end of the lever 29 and a fixed part of the housing to urge the lever 29 to the position shown in dotted lines at 32 in Figure 3. In this position the lever 29 extends partly across an aperture 33 in the housing between the handle 21 and the storage compartment 22, but leaving space for an operator's fingers to be inserted beneath the lever 29 when holding the handle 21. In this position of the lever 29 the plunger is in an uppermost position.

By squeezing the lever 29 upwardly from the position shown in dotted lines in Figure 3 to the position shown in full lines, the arcuate toothed rack 31 rotates the pinion 28 anti-clockwise (as seen in Figure 3) which in turn drives the plunger 25 downwardly. The relative diameters of the pinions 28 and 28a are selected to provide a required mechanical advantage ratio between movement of the lever 29 and corresponding movement of the plunger 25.

The tension spring 32 may, if required, be replaced by a compression spring disposed between the upper surface of the lever 29 and the internal upper surface of the main body part 21. Such compression spring may, for example, comprise a generally V-shaped spring in which the two arms of the spring engage the

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lever 29 and body part 21 respectively, and are integrally connected by a coiled spring portion.

Removably located in the storage compartment 22 of the housing is a replaceable holder or cartridge 34 which contains a supply of pairs of tag parts 10 and 17.

The cartridge 34, which may be moulded from lightweight plastics material, is of generally rectangular cross-section, as shown in Figure 5, and comprises a pair of facing opposed channels 35 in the upper portion thereof, and another pair of facing opposed channels 36 in the lower portion thereof. The upper channels 35 receive opposite sides of the discs 13 of a series of tag parts 10 whereas the lower channels 36 receive opposite sides of the discs 18 of a series of tag parts 17. As best seen in Figure 3, the discs of adjacent tags overlap. This allows a greater number of tags to be accommodated in the cartridge 34 than would be the case if the tags were simply disposed side-by-side in abutting relationship along the channels.

The discs of the tag parts furthest from the operating location 24 are engaged by a pusher element 37 which is in turn engaged by a circular reel 38 which is connected to one end of a leaf spring 39. The opposite end of the leaf spring 39 is connected to the housing 20 in the vicinity of the operating location 24. The spring 39 tends to coil up, thus thrusting the reel 38 against the pusher 37, and thereby urging the two rows

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of tag parts towards the operating location 24.

Adjacent the operating location 24 the side walls of the cartridge 34 are cut away, as indicated at 40, and are supported by a short transverse horizontal wall 41 spaced away from the path of movement of the plunger 25. The upper part of the cartridge 34 is provided with an aperture 42 through which the plunger may pass downwardly.

The dispensing device operates as follows:

10           The plunger 25 is initially in its uppermost retracted position, which allows a cartridge full of tag parts 10 and 17 to be inserted into the storage chamber 22. As the cartridge is inserted the reel 38, which is initially adjacent the operating location 24, is pushed 15 to the rear of the storage compartment 22 thus tensioning the spring 39. The tension in the spring 39 thus urges the rows of tag parts towards the operating location. The disc on the leading upper tag part 10 is urged against a front wall 43 on the cartridge and the 20 disc on the corresponding lower tag part 17 is urged against a front wall part 44 on the cartridge. As the cartridge 34 is pushed into the compartment 22 in the housing, its end wall depresses a spring-loaded ejection plunger in the end wall of the compartment, and when the 25 cartridge is fully home a spring-loaded catch 8 on the housing snaps into engagement with an abutment (not shown) on the cartridge to retain it within the housing. The dispenser is then loaded ready for use.

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To apply a tag to an animal's ear, a portion of the ear is passed into the cut away portion 40 of the cartridge, the sides of the housing being similarly cut away, so as to lie between the leading upper tag part 5 and the leading lower tag part 17. The operator then squeezes the lever 29 upwardly into alignment with the handle 21 forcing the plunger 25 downwardly. The head 26 of the plunger engages the upper part of the tag 10 and carries the tag downwardly, forcing its spike 11 through the animal's ear and into engagement with the opposed lower tag part 17 to which it becomes locked. Release of the lever 29 causes it to be returned to its initial position by the spring 32, withdrawing the plunger 25 upwardly so that the animal's ear, together with the tag, can be released from the slot in the dispensing device. As the plunger is retracted and the ear and tag removed, the remaining tag parts in the cartridge are urged forwardly to bring another pair on to opposite sides of the operating location.

20 When the cartridge is empty, the operator simply removes the cartridge from the storage chamber 22 and inserts a new cartridge, thus allowing a large number of animals to be tagged in rapid succession. The cartridge is removed by depressing the catch 8. This 25 releases the cartridge, allowing the spring-loaded plunger 9 to push it partly out of the compartment 22 so that it can be gripped by the operator's fingers and removed.

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The cartridges 34 may be reloaded, but preferably they are disposable, being formed of cheap moulded plastics and each being discarded when empty.

Although the described arrangement is preferred in which a cartridge preloaded with tag parts is inserted into a chamber in the dispensing device, the invention does not exclude arrangements in which the channels or other guideways for the tag parts are part of the structure of the dispensing device itself. In this case the tag parts would not be loaded in a cartridge but would have to be loaded individually into the dispenser between each series of operations. It will be appreciated, therefore, that the use of a cartridge system provides a major advantage in speed and convenience.

The device shown in Figures 3 and 4 is manually operated, and Figure 6 shows diagrammatically a similar view to Figure 3 of an alternative power operated dispenser.

In this case the general configuration of the dispenser housing 50 is similar to that of the Figure 3 arrangement, being provided with a handle part 51, a storage compartment 52, an operating compartment 53 and an operating location 54. The cartridge 55 is essentially similar to the cartridge 34 of the previous arrangement but is shown in Figure 6 as containing tag parts of a different type. In this arrangement each tag part, instead of being provided with a disc, is provided

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with simple rectangular flanges which extend from each side of the head 56 or socket 57 of the tag part but are generally of the same width as the diameter of the head or socket. The flanges therefore extend into the  
5 opposed channels in the cartridge 55, in similar fashion to the arrangement of Figure 5, but due to the narrowness of the flanges these do not overlap and the tag parts are in simple abutting relationship side-by-side, as shown in Figure 6.

10 In the power driven arrangement of Figure 6, the plunger 58 is connected to the piston of a fluid operated piston and cylinder assembly 59. The assembly, which may be driven by compressed air, is connected through a pipe 60 to a control valve 61 which may be  
15 operated selectively to place the pipe 60 in communication with a supply pipe 62 for air under pressure, or with the atmosphere. The valve 61 is operated through a pivoting arm 63 by a spring-loaded push button 64 which may be depressed by the finger of  
20 an operator when grasping the handle 51.

When the push button 64 is depressed the valve 61 is operated to place the cylinder assembly 59 in communication with the air under pressure, causing the plunger 58 to be driven downwardly, thus driving the  
25 leading upper tag part 65 downwardly through the animal's ear and into locking engagement with the lower tag part 66.

For convenience the supply of air, or other

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gas, under pressure may be provided by a portable pressurised cylinder of a type which is commonly available.

In the above-described arrangements, it is desirable for the lower end of the plunger 25 or 58 to grip the head of the upper tag part positively as it moves the tag part downwards into engagement with the lower tag part. Such positive gripping will reduce any tendency for the upper tag part to become deflected as it passes through the animal's ear and ensures that its alignment with the lower tag part is maintained. Figures 7 and 8 show a modified and preferred plunger assembly which includes an effective arrangement for positively gripping the upper tag part. Figures 7 and 8 show a plunger assembly on a manually operated version of the dispensing device, but it will be appreciated that, with suitable modification, an arrangement of the kind described might also be used with the air powered version.

Referring to Figures 7 and 8: the plunger assembly 25 comprises a generally cylindrical inner plunger 70 surrounded by an outer sleeve 71 within which the inner plunger is longitudinally slidable. The outer sleeve carries the aforementioned toothed rack 27 with which the pinion 28a is in driving engagement.

The inner plunger 70 is vertically slidable on a fixed shaft 72 which extends downwardly from the upper part of the casing 20 of the dispensing device. The



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lower end of the shaft 72 is formed with an annular groove 73 which receives an O-ring 74. The O-ring 74 is a loose sliding fit in a cylindrical chamber 75 in the plunger 70. The chamber 75 communicates with an upper  
5 cylindrical bore 76 in the plunger which surrounds the shaft 72. The diameter of the bore 76 is such that when the O-ring 74 enters the bore 76, as will be described below, the bore is a tight but sliding fit over the O-ring 74.

10 The upper end of the inner plunger 70 is formed with an outer peripheral flange 77 which, in the initial position, is received within a corresponding annular recess 78 in the upper end of the sleeve 71.

Mounted on the lower end of the inner plunger  
15 70 is a gripping device 79 which comprises a disc-like member 80 from which depend three circumferentially spaced resiliently flexible gripping elements 81, only one of the elements 81 being visible in Figure 7. Each gripping element 81 is part-annular as viewed in plan,  
20 and is generally triangular in cross-section to provide an outer part-conical surface 82 and an inner part-toroidal surface 83. The outer part-conical surfaces 82 of the gripping elements cooperate with an internal part-conical surface 84 formed on the lower end of the  
25 sleeve 71.

The gripping arrangement operates as follows:

During the initial downward movement of the plunger assembly 25 the sleeve 71 and inner plunger 70

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move together in the relative position shown in Figure 7, the chamber 75 in the plunger sliding freely over the O-ring 74. In this position the three resiliently flexible gripping elements 81 are urged outwardly, by their resilience, against the part-conical surface 84 on the sheath 71 and are thus separated from one another. As the plunger assembly moves downwards the gripping elements 81 move past the head 14 on the upper tag part 10 which is opposite the plunger until an abutment 85 on the plunger engages the head 14. This engagement temporarily restrains further downward movement of the inner plunger 70 but the outer sleeve 71 continues to move downwards relative to the inner plunger 70.

As the outer sleeve 71 moves downwards relative to the inner plunger 70, the engagement of the conical surface 84 on the sleeve against the conical surfaces 82 on the gripping elements 81 forces the gripping elements inwardly so that they close around the head 14 of the upper tag part and grip it. The head 14 is formed with a peripheral groove of arcuate section to receive the part-toroidal inner portions of the gripping elements. Figure 8 shows this engagement between the gripping elements 81 and the head 14 at a later stage in the operation of the dispensing device.

Continued downward movement of the sleeve 71 carries the inner plunger 70 and upper tag part 10 with it, as shown in Figure 8, until the spike 11 on the upper tag part engages the lower tag part 17 in the

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manner previously described. During this latter part of the downward movement of the inner plunger 70, with the sleeve 71, the bore 76 in the inner plunger 70 passes over the O-ring 74. Since the O-ring 74 is a tighter sliding fit in the bore 76 this tends to apply a restraining force to the downward movement of the inner plunger 70. This ensures that the outer sleeve 71 must always apply a downward force to the inner plunger 70, thus ensuring that the gripping elements 81 are constantly urged inwardly by their engagement with the part-conical surface 84 on the sleeve 71. This positive gripping of the head 14 of the upper tag part 10 ensures that the tag part does not become displaced or deflected as it is thrust downwards.

15           Once the two parts of the tag are engaged, the operating lever of the dispensing device is released, rotating the pinion 28a in the opposite direction to retract the plunger assembly 25 upwardly again. Initially, however, as the sleeve 71 begins to move upwardly, the inner plunger 70 is temporarily restrained against upward movement by the frictional engagement between the O-ring 74 and the bore 76 in the plunger 70, so that the sleeve 71 moves upwardly relative to the inner plunger 70. The upward movement of the part-conical surface 84 relative to the gripping elements 81 allows the gripping elements to move outwardly, due to their resilience, and disengage from the head 14 of the upper tag part. After this initial

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upward relative movement the annular recess 78 in the upper end of the sleeve 71 engages the flange 77 on the inner plunger 70 so that the two parts of the plunger assembly then move upwardly together back to the  
5 initial position shown in Figure 7, ready for another dispensing operation to be performed.

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CLAIMS

1. A dispensing device for applying two-part tags, the device comprising a main body part, means for supporting a first tag part in an operating location on  
5 the body part, means for supporting a second tag part in said operating location but spaced from the first tag part, an operating device mounted on the main body part and movable from a rest position to displace the first tag part into locking engagement with the second tag  
10 part, operator controlled actuating means for effecting said movement of the operating device, means for returning the operating device to said rest position, and means for feeding pairs of first and second tag parts successively to said operating location from  
15 supplies of said tag parts.

2. A dispensing device according to Claim 1, wherein the operating device comprises a plunger mounted for reciprocating movement on the main body part and having a head portion for engagement with said first tag  
20 part.

3. A dispensing device according to Claim 2, wherein the plunger assembly is mounted for linear reciprocating movement on the main body part.

4. A dispensing device according to Claim 2 or  
25 Claim 3, wherein said head portion of the plunger assembly includes means for releasably gripping said first tag part, during its displacement into locking engagement with the second tag part.

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5. A dispensing device according to Claim 4, wherein said gripping means comprise a plurality of spaced gripping elements movably mounted on the plunger assembly and operating means for automatically moving  
5 said gripping elements inwardly into gripping engagement with said first tag part as the plunger assembly is moved towards said first tag part.

6. A dispensing device according to Claim 5, wherein said plunger assembly comprises a plunger on  
10 which said gripping elements are movably mounted, and an operating member capable of limited movement relative to the plunger, the operating member being adapted to effect said inward movement of the gripping elements as a result of said limited relative movement.

15 7. A dispensing device according to Claim 6, wherein said operating member comprises a sleeve which surrounds said plunger, said sleeve having at one end thereof a formation shaped to cooperate with said gripping elements to effect said inward movement of the  
20 gripping elements when the sleeve moves relatively to the plunger.

8. A dispensing device according to any of Claims 1 to 7, wherein the actuating means comprise a manually movable member mounted on the body part and coupled to  
25 the operating device.

9. A dispensing device according to Claim 8, wherein the manually movable member comprises a lever pivotally mounted on the body part and coupled to the

operating device by a transmission mechanism.

10. A dispensing device according to Claim 9, wherein said transmission mechanism comprises a rack and pinion mechanism.

5 11. A dispensing device according to any of Claims 1 to 7, wherein the actuating means comprise power operated means.

12. A dispensing device according to Claim 11, wherein the power operated means comprise a fluid  
10 actuated piston and cylinder device.

13. A dispensing device according to any of Claims 1 to 12, wherein the means for returning the operating device to the rest position comprise spring means connected between the actuating means and the main body  
15 part.

14. A dispensing device according to any of Claims 1 to 13, wherein the means for feeding pairs of first and second tag parts to the operating location comprise first and second guideways leading to the operating  
20 location and adapted to receive a plurality of first and second tag parts respectively, means being provided to urge the tag parts along their respective guideways.

15. A dispensing device according to Claim 14, wherein said means to urge the tag parts along their  
25 respective guideways comprise pusher elements engaging those tag parts in the respective guideways which are furthest from the operating location, thereby to push all the tag parts in the guideway towards the operating

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location.

16. A dispensing device according to Claim 15, wherein said pusher elements comprise parts of a single pusher unit.

5 17. A dispensing device according to Claim 15 or Claim 16, wherein spring means are provided to urge the pusher elements towards the operating location.

18. A dispensing device according to any of Claims 15 to 17, wherein said guideways include channels which  
10 receive portions of the tag parts respectively.

19. A holder for a plurality of pairs of tag parts, for use with the dispensing device according to any of Claims 14 to 18, the holder being adapted to support said tag parts in position one next to another  
15 in the relationship required for the dispensing device, the aforesaid guideways being provided on the holder, and the holder being adapted to be connected to the main body part of the dispensing device in such manner that the guideways are in the required position with respect  
20 to the operating location.

20. A holder according to Claim 19, wherein at least one of said guideways is so shaped as to receive a plurality of tag parts in side-by-side overlapping relationship.

25 21. A dispensing device substantially as hereinbefore described with reference to Figures 3-5 or Figure 6 of the accompanying drawings.

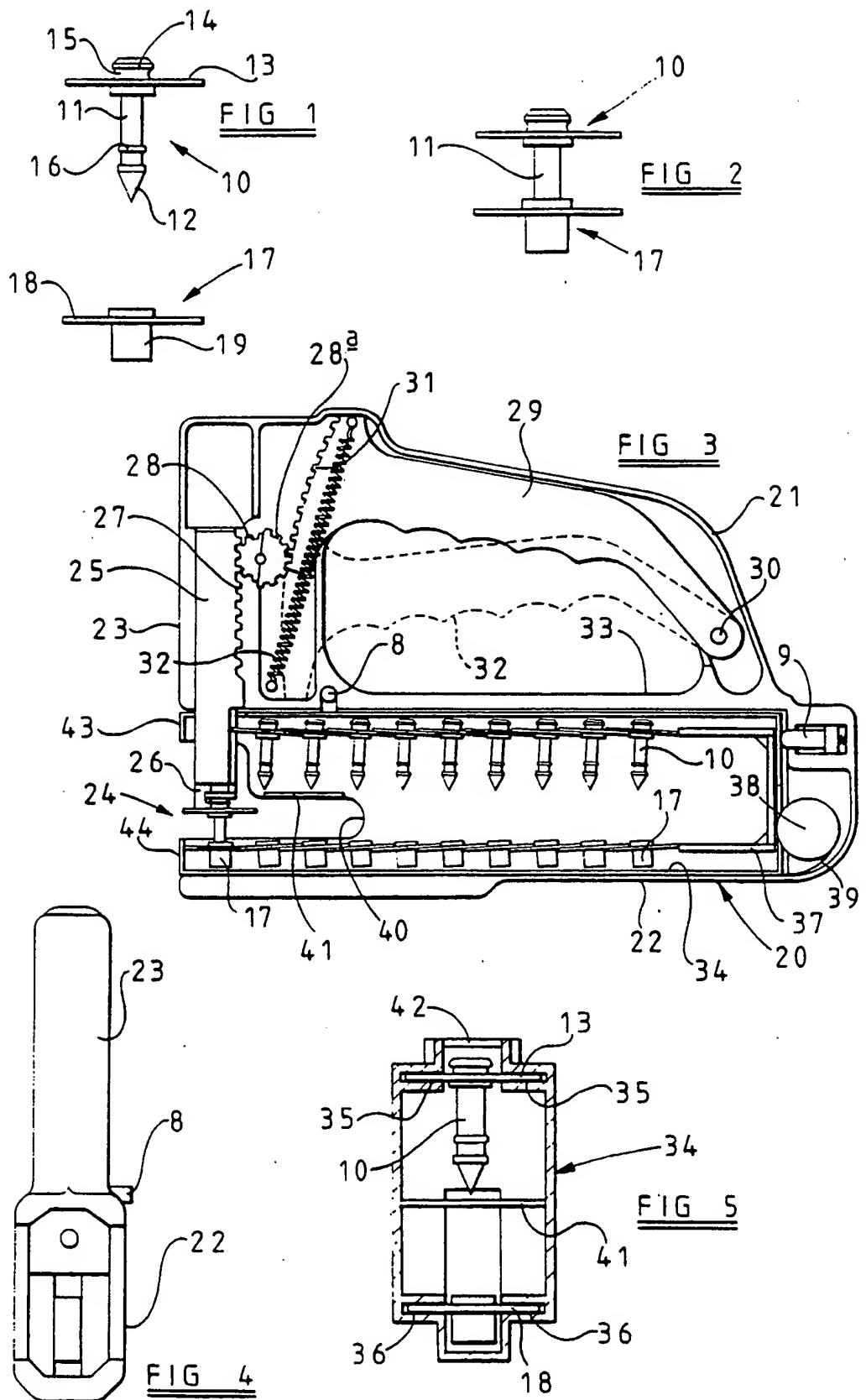
22. A holder for a plurality of pairs of tag



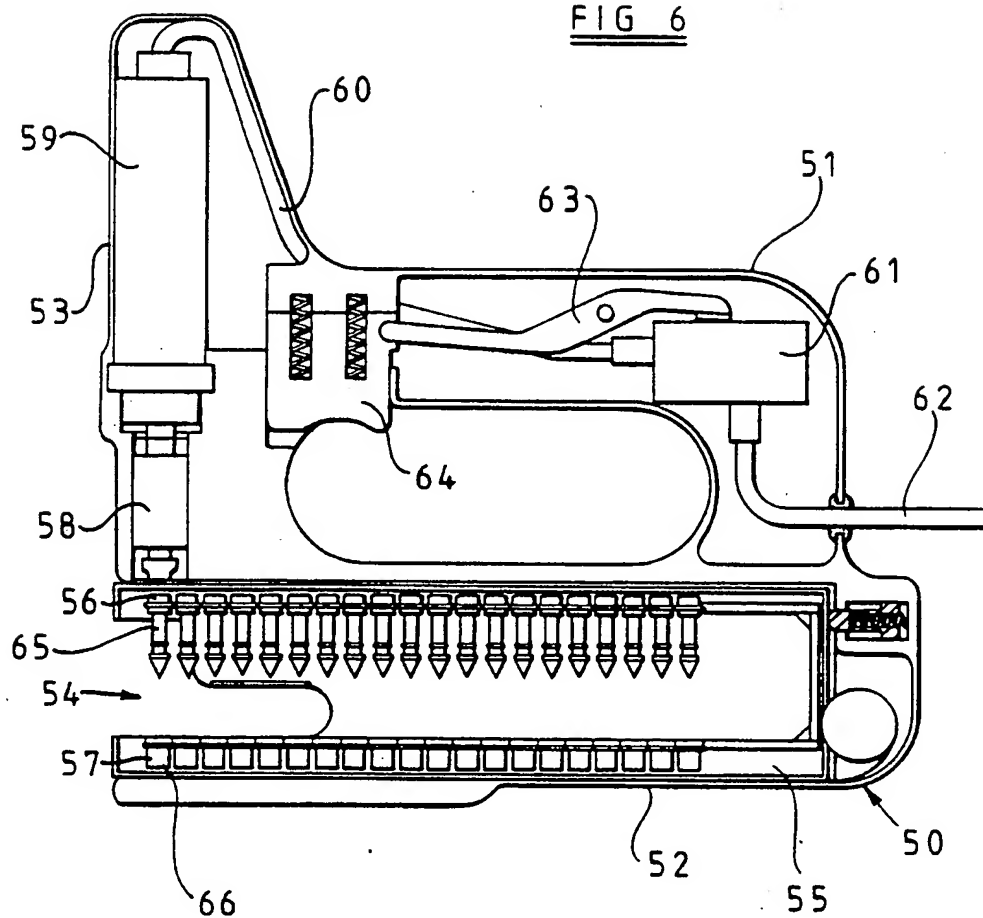
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parts, for use with a dispenser according to any of the preceding claims and substantially as hereinbefore described with reference to Figures 3 and 5, or Figure 6, of the accompanying drawings. .

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FIG 6

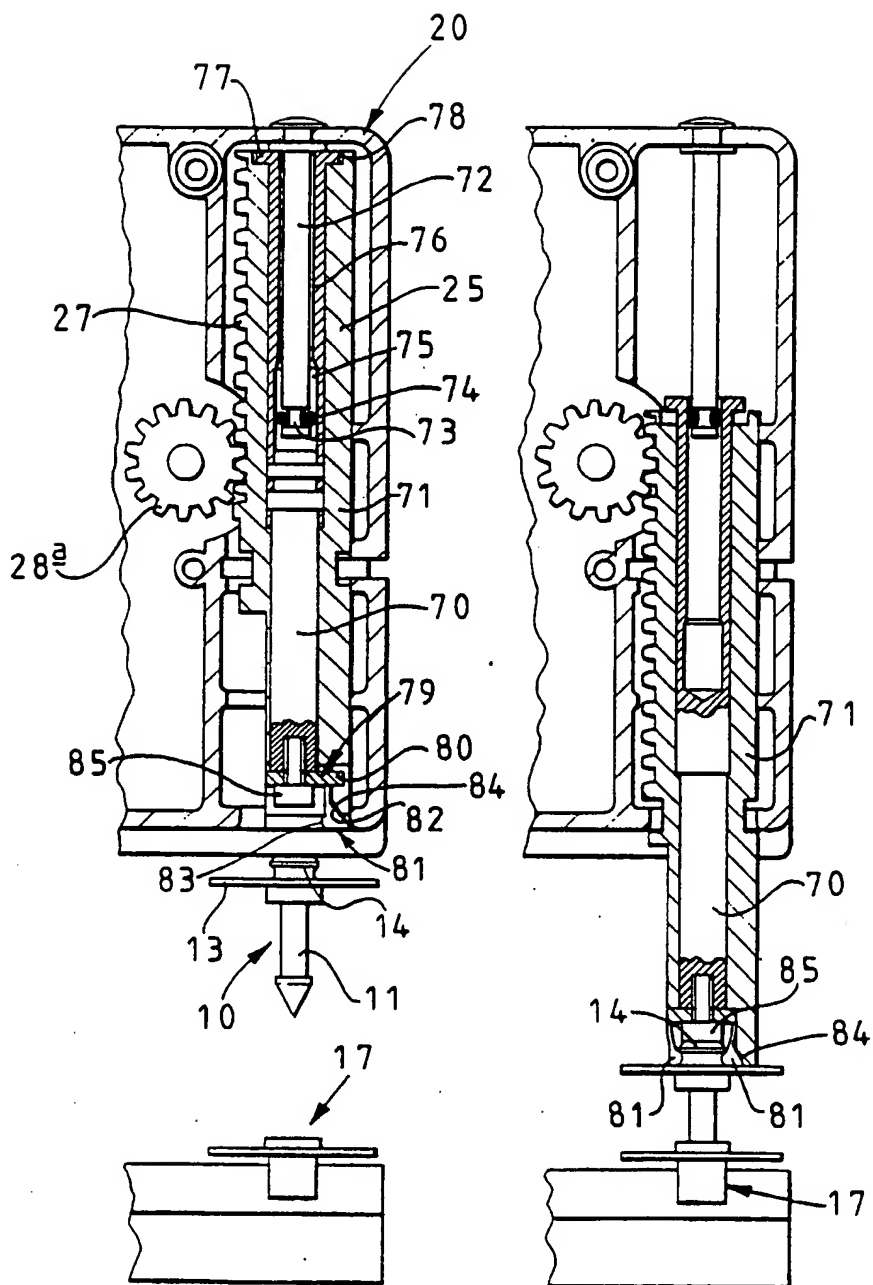


FIG 7

FIG 8

# INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/GB 93/02596

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 5 A01K11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 A01K B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| X          | GB,A,2 010 727 (MACKENZIE) 4 July 1979<br>see the whole document<br>---            | 1-3,8,9,<br>14-22     |
| A          | GB,A,1 415 650 (COUGHTRIE) 26 November 1975<br>---                                 |                       |
| A          | EP,A,0 138 570 (ALLFLEX INTERNATIONAL LTD.) 24 April 1985<br>-----                 |                       |

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

29 March 1994

Date of mailing of the international search report

15. 04. 94

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Fax (+ 31-70) 340-3016

Authorized officer

von Arx, V

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/GB 93/02596

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---------------------|----------------------------|---------------------|
| GB-A-2010727                              | 04-07-79            | AU-A- 4275178              | 28-06-79            |
| GB-A-1415650                              | 26-11-75            | NONE                       |                     |
| EP-A-0138570                              | 24-04-85            | AU-A- 3407384              | 18-04-85            |
|   |                     | JP-A- 60156334             | 16-08-85            |

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